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Diagenetic Quantification in Relation to Pore Size Population Using Digital Rock Technology

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Quantifying reservoir property is one of the most crucial works of petroleum exploration and production. Determining transport properties in reservoir rocks requires accurately quantifying the pore system. The study of the pore structure in porous media is to understand the processes of single and multiphase fluid flow. Quantification of the pore system in reservoir rocks at large scale is essential to understand the displacement process in the field to locate the remaining hydrocarbon. To acquire a better understanding of the diagenesis of reservoir rock and pore structure, a quantitative method is required. In principle, a representative large-scale multiscale pore structure model for heterogeneous reservoirs can be constructed by adding diagenesis and facies in the reservoir modelling. This study tries to use the detailed pore structure and diagenesis information from high-resolution scanning electron microscopy (SEM) imaging to quantify the diagenesis linked to the reservoir rocks'quality. This involves the quantification of population of pore and grain size distribution and cement spatial distribution features of rock samples by categorising them into three different classes. The North Sea Oil Field data is used as a case study.
Based on the cement feature segmented from high-resolution SEM image, the limit of segmentation of cement, the connectivity of cement particle was observed and evaluated. Through the pore size distribution functions fitting, the cubic polynomial exhibits the best fits for pore population from the North Sea Oil Field data. The digital rock tools are able to provide the details of the pore structure and associated diagenetic process with lithofacies. The quantitative results can be used for further analysis on diagenesis process that can be then linked with well logging features at next study.

Participation

In-Person

References

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